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COUNTRY ANALYSIS BRIEFS

China

Last Updated: November 2010

Background

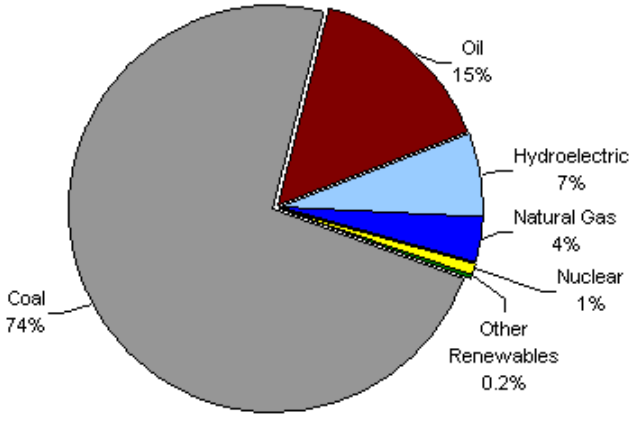
China is the world's most populous country and the second largest energy consumer behind the United States . Rising oil demand and imports have made China a significant factor in world oil markets.

China is the second largest oil consumer behind the United States. China emerged from being a net oil exporter in the early 1990s and became the world's third-largest net importer of oil in 2006. China's oil consumption growth accounted for about a third of the world's oil consumption growth in 2009. Natural gas usage in China has also increased rapidly in recent years, and China has looked to raise natural gas imports via pipeline and liquefied natural gas (LNG). China is also the world's largest producer and consumer of coal, an important factor in world energy markets.

China is the world's most populous country and has a rapidly growing economy. China's real gross domestic product (GDP) grew at an estimated 8.7 percent in 2009, while the country registered average growth of 10 percent between 2000 and 2008. The recent global financial crisis caused China's GDP to slow from highs of 13 percent in 2007, to 6.2 percent in the first quarter of 2009 (measured against Q1 2008), the lowest quarterly rate in 10 years. However, the second quarter 2009 saw GDP growth rebound somewhat and until Q1 2010, the rate has steadily risen to 11.9 percent, the fastest year over year growth in 3 years. Asia, particularly China and India, was the first area to see growth during the global recession. Most analysts predict China will grow around 10 percent in 2010.

China's recent 4-trillion yuan ($586 billion) economic stimulus package, launched in November 2008, is focused on boosting China's domestic consumption (currently about a third of real GDP) and fixed asset investment, as well as improving industry value chains and energy conservation in order to decrease dependence on an export-driven economy. Using various measures such as tax reductions, rebates, fiscal subsidies, greater access to credit, and direct government expenditures, China is targeting almost all sectors of the economy: real estate/construction, transportation and power infrastructure, agriculture, social services, heavy and light industry, Sichuan earthquake reconstruction, technology advancement, and rural development. In light of the government's goals for energy security and energy efficiency, China is using its stimulus package through vehicles such as tax breaks, advantageous lending rates, and a foreign exchange fund to encourage state-owned oil companies to expand upstream investments abroad, increase downstream refining capacity, and augment crude and oil product stockpiles. Industry analysts anticipate the fiscal stimulus will translate into economic development in the first half of 2010 and generate at least a moderate increase of domestic consumption including demand for energy commodities and thereafter will see a slower growth in the remainder of 2010 and 2011. In January 2010, the Chinese government implemented monetary tightening measures such as increasing bank reserve requirements to stem massive bank lending and potential inflation. China is currently trying to balance the concern over market bubbles and an overheated economy against the desire for sustained economic growth and job creation.

Total Energy Consumption in China, by Type (2008)



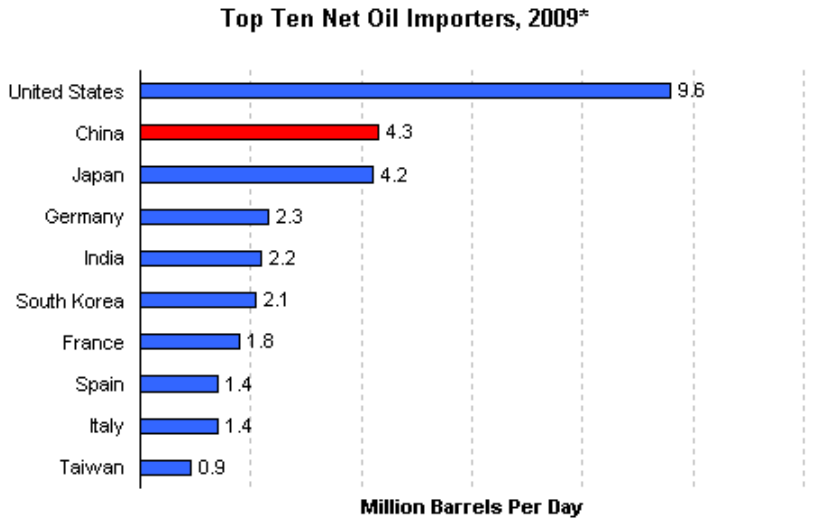
Source: EIA International Energy Statistics 2008

Coal supplied the vast majority (74 percent) of China's total energy consumption requirements in 2008. Oil is the second-largest source, accounting for 15 percent of the country's total energy consumption. While China has made an effort to diversify its energy supplies, hydroelectric sources (7 percent), natural gas (4 percent), nuclear power (1 percent), and other renewables (0.2 percent) account for relatively small amounts of China's energy consumption mix. EIA envisages coal's share of the energy mix will fall to 62 percent by 2035 due to anticipated increased efficiencies and China's goal to reduce its carbon intensity or carbon emissions per unit of GDP by at least 40 percent from 2005 levels by 2020. China also recently announced plans to reduce its energy intensity levels (energy consumed per unit of GDP) by 31 percent from 2010 to 2020 and increase non-fossil fuel energy consumption to 15 percent of the energy mix in the same time period.

Oil

China is the world's second-largest consumer of oil behind the United States , and for the first time the second-largest net importer of oil in 2009.

China consumed an estimated 8.3 million barrels per day (bbl/d) of oil in 2009, up nearly 500 million bbl/d from year earlier levels. During that same year, China produced an estimated 4.0 million bbl/d of total oil liquids, of which 96 percent was crude oil. China's net oil imports reached about 4.3 million bbl/d in 2009, making it the second-largest net oil importer in the world behind the United States and for the first time surpassing Japan's imports. EIA forecasts that China's oil consumption will continue to grow during 2010 and 2011, with oil demand reaching almost 9.6 million bbl/d in 2011. This anticipated growth of over 1.2 million bbl/d between 2009 and 2011 represents about 37 percent of projected world oil demand growth during the 2-year period according to the September 2010 *Short-Term Energy Outlook*. By contrast, China's oil production is forecast to rise by about 150 thousand bbl/d to nearly 4.2 million bbl/d in 2011. In the longer term, EIA's *International Energy Outlook* projects Chinese demand of liquids fuels to rise to around 17 million bbl/d by 2035. According to *Oil & Gas Journal* (*OGJ*), China had 20.4 billion barrels of proven oil reserves as of January 2010, up over 4 billion barrels from the prior year.



Source: EIA Short-Term Energy Outlook (September 2010) *estimate

Sector Organization

Energy Policy

The Chinese government's energy policies are dominated by the country's growing demand for oil and its reliance on oil imports. The National Development and Reform Commission (NDRC) is the primary policymaking and regulatory authority in the energy sector, while four other ministries oversee various components of the country's oil policy. The government launched the National Energy Administration (NEA) in July 2008 in order to act as the key energy regulator for the country. The NEA, linked with the NDRC, is charged with approving new energy projects in China, setting domestic wholesale energy prices, and implementing the central government's energy policies, among other duties. The NDRC is a department of China's State Council, the highest organ of executive power in the country. In 2007, China outlined its energy policy goals in the Proposed Energy Law, though the law has yet to be enacted. In January 2010, the government formed a National Energy Commission which attempts to consolidate energy policy among the various agencies under the State Council.

National Oil Companies

China's national oil companies (NOCs) wield a significant amount of influence in China's oil sector. Between 1994 and 1998, the Chinese government reorganized most state-owned oil and gas assets into two vertically integrated firms: the China National Petroleum Corporation (CNPC) and the China Petroleum and Chemical Corporation (Sinopec). These two conglomerates operate a range of local subsidiaries, and together dominate China's upstream and downstream oil markets. CNPC remains the much larger and influential NOC and is the leading upstream player in China. CNPC, along with its publicly-listed arm PetroChina, account for roughly 60 percent and 80 percent of China's total oil and gas output, respectively, though the company's current strategy is to integrate its sectors and capture more downstream market share. Sinopec, on the other hand, has traditionally focused on downstream activities such as refining and distribution with these sectors making up nearly 80 percent of the company's revenues in recent years and is gradually seeking to acquire more upstream assets.

Additional state-owned oil firms have emerged in the competitive landscape in China over the last several years. The China National Offshore Oil Corporation (CNOOC), which is responsible for offshore oil exploration and production, has seen its role expand as a result of growing attention to offshore zones. Also, the company has proven to be a growing competitor to CNPC and Sinopec by not only increasing its E&P expenditures in the South China Sea but also extending its reach into the downstream sector particularly in the southern Guangdong Province through its recent 300 billion yuan investment plan. The Sinochem Corporation and CITIC Group have also expanded their presence in China's oil sector, although their involvement in the oil sector remains dwarfed by CNPC, Sinopec, and CNOOC. The government intends to use the stimulus plan to enhance energy security and strengthen Chinese NOCs' global position by offering various incentives to invest both upstream and downstream.

Pricing Reform

The Chinese government launched a fuel tax and reform of the country's product pricing mechanism in December 2008 in order to tie retail oil product prices more closely to international crude oil markets, attract downstream investment, ensure profit margins for refiners, and reduce energy intensity caused by distortions in the market pricing. When international crude oil prices skyrocketed in mid-2008, the capped fuel prices downstream caused some refiners, especially the smaller teapots, to cease production causing supply shortfalls and the major NOCs, particularly Sinopec, to incur substantial profit losses. During the first half of last year, the government issued value added tax rebates on fuel imports and some direct subsidies to stem state-refiners' losses.

China is taking advantage of the economic recession to liberalize its pricing system and encourage more market responsiveness and fuel efficiency. When fuel prices fluctuate more than 4 percent of the average crude oil price of three grades over 22 consecutive working days, the NDRC can alter the ex-refinery price. The government also sets transportation charges, processing costs, and refining margins (5 percent when crude prices are below $80/bbl). Additionally, a consumption tax and value-added tax is added for gasoline and diesel fuels. These taxes are set to replace six transportation fees established by local authorities.

As a result of these reforms, China raised fuel prices five times and lowered prices three times in 2009. Comparatively, in the first half of 2010, there were only two price alterations, an increase of 4 to 5 percent in April for gasoline and diesel and a decrease of 3 percent in June as a result of the substantially higher retail prices compared to international markets. In October 2010, the government reversed course and raised rates by 3 percent. Refinery gate prices for gasoline and diesel are now about 7,420 yuan/ton and 6,680 yuan/ton, respectively.

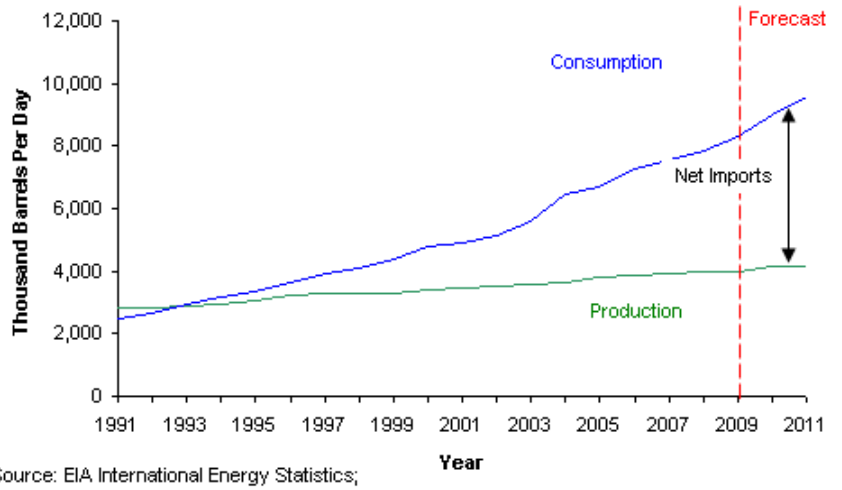
In July 2010, the government announced it would levy a new 5 percent ad valorem resource tax on hydrocarbons in 13 provinces including Xinjiang in the western region. This tax is to narrow the income gap between the western and coastal provinces though could affect CNPC's and Sinopec's E&P earnings as these areas contribute 30 percent and 80 percent, respectively, of China's oil and gas production.

Exploration and Production

China 's largest oil fields are mature and production has peaked, leading companies to focus on developing largely untapped reserves in the western interior provinces and offshore fields.

China's total oil production reached 4.0 million bbl/d in 2009, similar to production in 2008, but the first half of 2010 saw an increase of over 0.2 million bbl/d from the same period the year prior. This was primarily due to new offshore production growth. China's largest and oldest oil fields are located in the northeast region of the country. CNPC's Daqing field produced about 801,000 bbl/d of crude oil in 2009, according to FACTS Global Energy's most recent estimate. Sinopec's Shengli oil field produced about 558,000 bbl/d of crude oil during 2009, making it China's second-largest oil field. However, Daqing, Shengli, and other ageing fields have been heavily tapped since the 1960s, and output is expected to decline significantly in output in the coming years. Recent exploration and production (E&P) activity has focused on the offshore areas of Bohai Bay and the South China Sea as well as onshore oil and natural gas fields in western interior provinces such as Xinjiang, Sichuan, Gansu, and Inner Mongolia, and China made over 50 oil discoveries in 2009.

China's Oil Production and Consumption, 1991-2011*



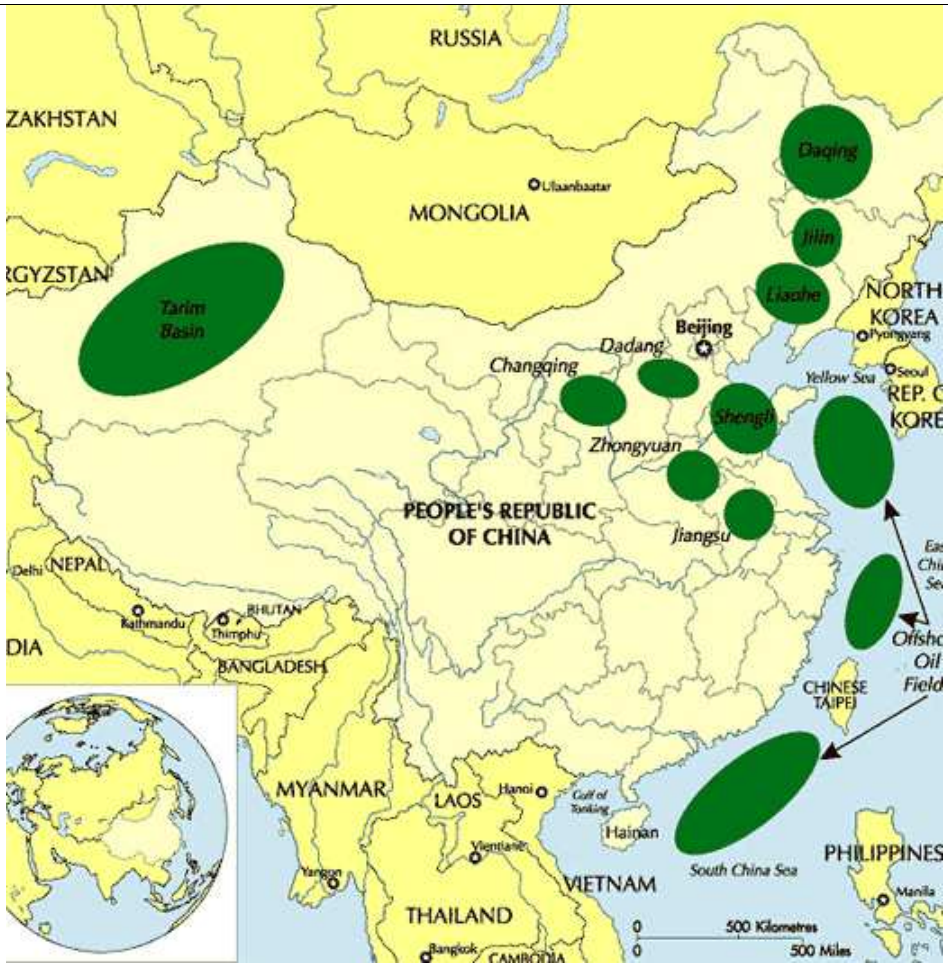
Source: EIA International Energy Statistics;
Short-Term Energy Outlook (September 2010)

*forecasted

Onshore

Roughly 85 percent of Chinese oil production capacity is located onshore. Although offshore E&P activities have increased substantially in recent years, China's interior provinces, particularly in the northwest's Xinjiang Province, have also received significant attention. Recently, China announced its plan to create Xinjiang into the country's largest oil and gas production and storage base. By 2020, CNPC aims to boost the province's hydrocarbon production capacity to 450 million barrels of oil equivalent (boe), up from 278 million boe in 2009 and spend nearly $30 billion (200 billion yuan) on E&P in this region. The onshore Junggar, Turpan-Hami, and Ordos Basins have all been the site of increasing E&P work, although the Tarim Basin in northwestern China's Xinjiang Uygur Autonomous Region has been the main focus of new onshore oil prospects. Reserve estimates for Tarim vary, though IHS estimates 290 million barrels. Only 12 percent of the basin has been explored. PetroChina reported that reserve additions in 2009 were 3.3 billion barrels of oil equivalent. Crude oil production from Tarim reached 111,000 bbl/d in 2009. Since 2005, hydrocarbon production from Tarim has doubled, and the NOCs are taking advantage of tax breaks and other incentives to develop the region and offset declines in mature basins. PetroChina envisages boosting production in the Junggar Basin, one of Xinjiang's oldest basins, from 250,000 bbl/d in 2008 to 328,000 bbl/d by 2015.

China's NOCs are also investing to increase oil recovery rates at the country's mature oil fields. Increasingly, CNPC is utilizing natural gas supplies from the Daqing field for reinjection purposes to fuel enhanced oil recovery (EOR) projects. CNPC hopes that EOR techniques can help stabilize Daqing's oil output in the years ahead. However, China's domestic demand for natural gas supplies is also increasing, which may put a competing claim on oil output from Daqing. The map below delineates the location of some of the major Chinese oil basins.



Source: Rigzone

Offshore

About 15 percent of overall Chinese oil production is from offshore reserves, and most of China's net oil production growth will likely come from offshore fields. The offshore volumes will offset some of the declines from the more mature onshore fields in eastern China. Also, China recently announced plans to spend roughly $40 billion to boost offshore oil production as part of the new five-year development plan.

Offshore E&P activities have focused on the Bohai Bay region, Pearl River Delta, South China Sea, and, to a lesser extent, the East China Sea. The Bohai Bay Basin, located in northeastern China offshore from Beijing, is the oldest oil-producing offshore zone and holds the bulk of proven offshore reserves in China. In May 2007, PetroChina announced a reserve assessment of its newest oil field in Bohai Bay, which the company claims could be the largest oil find in three decades once a final reserve estimate is made. The Nanpu field holds proven oil reserves of 3.7 billion barrels. PetroChina initiated phase one development of the Nanpu field in June 2007, and hopes to bring 200,000 bbl/d of crude oil production onstream by 2012.

Offshore areas were expected to account for much of China's growth in oil production. CNOOC made 8 new discoveries in offshore reserves, increasing the company's proven oil reserves to 1.6 billion barrels. CNOOC intends to double oil production in the Bohai Bay where over half of the NOC's production is expected to originate by 2015.

In 2009, CNOOC's total hydrocarbon production in the South China Sea (SCS) was 245, 000 boe/d – 191,000 boe/d in oil and 54,000 boe/d (324 MMcf/d) in natural gas. Also, according to PFC Energy, CNOOC's proven hydrocarbon reserves in 2009 in the SCS were 957 million boe, up 28 percent from a decade ago. CNOOC and ConocoPhillips are developing the Panyu oilfields with output peaking at 60,000 bbl/d. In 2008, CNOOC, along with its partner Husky Energy of Canada, commenced commercial production at the Wenchang oil fields which is expected to produce nearly 19,000 bbl/d. CNOOC also brought on the Xijiang 23-1 field on stream in 2008 and anticipates 40,000 bbl/d of crude oil production. In 2010, CNOOC made another significant discovery of the Enping Trough in the shallow waters of the SCS, and area could generate up to 30,000 bbl/d.

Whereas onshore oil production in China is mostly limited to CNPC and CNOOC, the two major upstream NOCs, international oil companies have been granted much more access to offshore oil prospects mainly through PSC agreements. Aside from ConocoPhillips, other foreign oil majors involved in offshore E&P work in China include: Shell, Chevron, BP, Husky, Anadarko, and Eni, among others. These IOCs leverage their technical expertise in order to partner with a Chinese NOC and make a foray into the Chinese markets. In order to share costs on exploration and gain technical expertise, CNOOC tendered 13 blocks in May 2010 in the South China Sea, all focused on shallow-water areas of the Pearl River, Beibuwan, and Yinggehai basins. BP and Chevron plan to bid for a South China Sea exploration block in 2010.

Territorial Disputes

CNOOC is also involved in exploration activities in the East China Sea, although territorial disputes with its neighbors have so far limited large-scale development of fields in the region. China and Japan's Exclusive Economic Zones (EEZs) overlap in parts of the East China Sea that are believed to hold hydrocarbon reserves. The two countries have held negotiations to resolve the disputes, and in June 2008, the two countries reached an agreement to jointly develop the Chunxiao/Shirakaba and Longjing/Asurao fields. The agreement stipulated that the investors would share profits and risks equally. However, in early 2009, the agreement unraveled when China asserted sovereignty over the fields following Japanese disputes of actual E&P work at the fields, and recent tensions in the second half of 2010 have surfaced between the two countries over the gas fields.

China claims ownership of a portion of the potentially hydrocarbon rich Spratly Islands in the South China Sea, as do the Philippines, Malaysia, Taiwan, and Vietnam. In June 2007, BP abandoned plans to conduct exploration activities near the Spratly Islands, citing ongoing uncertainty over competing ownership claims between China and Vietnam. Also, as a result of the Philippines' passing a legislative bill claiming the islands, China has protested. The Paracel Islands, which China first occupied in 1974, are also claimed by Vietnam.

Overseas E&P

With China's expectation of growing future dependence on oil imports and the need for diversification of energy supply sources, Chinese NOCs have sought interests in E&P projects overseas. CNPC has been the most active company, while Sinopec, CNOOC, and other smaller NOCs have also expanded their overseas investment profile. China is taking advantage of the economic downturn and lower asset values to step up its global acquisitions and financing of projects in upstream, midstream, and downstream sectors. From October 2008 to December 2009, the major Chinese national oil companies (NOCs) invested nearly $17 billion for direct acquisition of oil and gas assets from other companies, illustrating a significant increase from the prior decade. Also, Chinese NOCs secured bilateral loan-for-oil deals amounting to almost $70 billion with several countries according to PFC Energy.

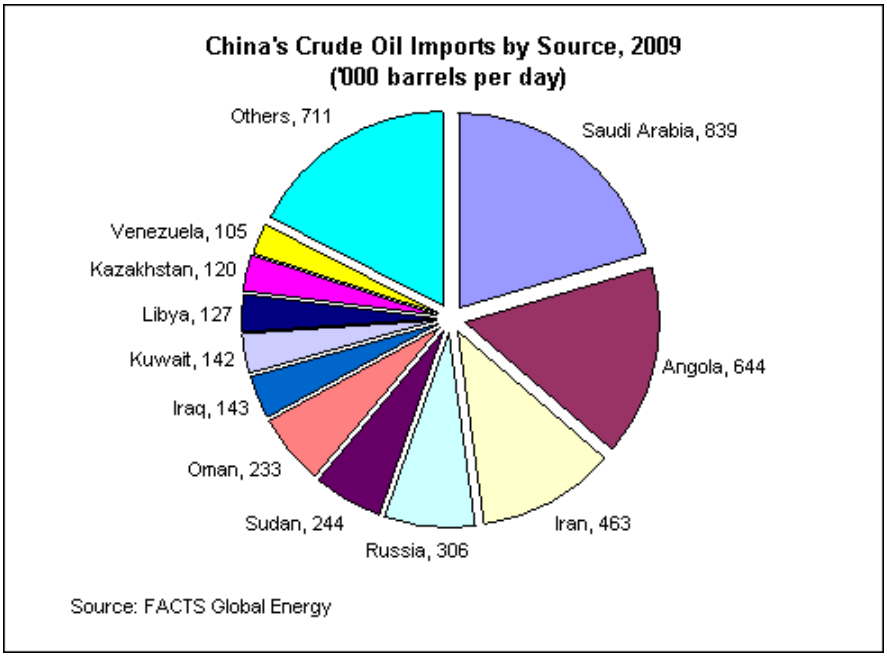
China can use its vast foreign exchange reserves, estimated at $2 trillion, to help leverage investments. China finalized loan for oil deals recently with Russia, Brazil, Venezuela, Kazakhstan, Ecuador and agreed to a loan of $3 billion to Turkmenistan to assist in developing the South Iolotan gas field project to feed the Central Asia Gas Pipeline. Turkmenistan announced in August 2010 that it is seeking another $4.1 billion for the field development. China agreed to loan Russian companies, Rosneft and Transneft $25 billlion to finance the East Siberia Pacific Ocean oil pipeline in exchange for 300,000 bbl/d of oil shipments. The Chinese Development Bank (CDB) also agreed to loan Petrobras of Brazil $10 billion so that Sinopec can access 200,000 bbl/d of oil for export to China for 10 years. China and Venezuela set up a joint $12 billion development fund to finance various projects to increase oil exports to China. Furthermore, in 2010, CNPC and PDVSA, Venezuela's NOC, set up another joint venture with $16 billion in investments to raise crude production in the Orinoco Belt by 400,000 bbl/d by 2016, and industry sources report that China recently offered another $20 billion in soft loans for oil to the country. CNPC and the China Export-Import Bank intend to lend Kazakhstan $5 billion each in two loans ($10 billion total) allowing CNPC a much larger role in the upstream oil development in the Central Asian country, following the company's acquisition of PetroKazakhstan in 2005. China finalized a $1 billion loan deal with Ecuador in July 2010 in exchange for 36,000 bbl/d of crude oil for 4 years.

China's overseas equity oil production grew significantly this decade from 140,000 bbl/d in 2000 to 900,000 bbl/d in 2008 according to FACTS Global Energy. Overseas equity oil production represented roughly 23 percent of China's total oil production in 2008. CNPC held hydrocarbon assets in 27 countries by the end of 2008 and 612,000 bbl/d of overseas oil equity production, about 70 percent of the total overseas market share from Chinese companies. Also, CNPC plans to spend $60 billion to expand overseas production to 4 million bbl/d by 2020. As China expands its refining capacity to accept sour and high-sulfur crude oil, Chinese NOCs are looking to invest in more Middle Eastern fields.

Oil Imports

The Middle East remains the largest source of China's crude oil imports, although African countries also contribute a significant amount to China's crude oil imports. According to FACTS Global Energy, China imported 4 million bbl/d of crude oil in 2009, of which approximately 2 million

bbl/d (50 percent) came from the Middle East, 1.2 million bbl/d (30 percent) from Africa, 184,000 bbl/d (5 percent) from the Asia-Pacific region, and 686,000 bbl/d (17 percent) came from other countries. In 2009, Saudi Arabia and Angola were China's two largest sources of oil imports, together accounting for over one-third of China's total crude oil imports. In the first half of 2010, crude oil imports jumped to over 4.7 million bbl/d or a 30 percent year on year increase, resulting from China's increasing demand. Also, Angola has become as significant an exporter of crude to China as Saudi Arabia and in some months has been the largest supplier. As China's refineries become more sophisticated and the country seeks to diversify supply, industry reports forecast that regions outside the Middle East will slightly increase their share in the supply mix in the next year. China imported approximately 0.7 million bbl/d and exported 0.5 million bbl/d of key petroleum products including LPG, gasoline, diesel, jet fuel, fuel oil, and lubricants in 2009, and exports of products are expected to remain high as refining capacity is added in 2010 and beyond. The EIA expects China to import about 72 percent of its crude oil by 2035, a significant rise from the current 50 percent according to the *International Energy Outlook*.



Pipelines

China has actively sought to improve the integration of the country's domestic oil pipeline network as well as to establish international oil pipeline connections with neighboring countries to diversify oil import routes. In March 2007, CNPC spearheaded the Beijing Oil & Gas Pipeline Control Center that monitors all long-distance.

Domestic System

According to the CNPC, China has about 13,932 miles of total crude oil pipelines (70 percent managed by CNPC) and nearly 8,265 miles of oil products pipelines in its domestic network. Total oil liquids and natural gas pipeline is increasing at about 6 percent per year. At present, the bulk of China's oil pipeline infrastructure serves the more industrialized coastal markets. However, several long-distance pipeline links have been built or are under construction to deliver oil supplies from newer oil-producing regions or from downstream centers to more remote markets. In October 2006, the Western China Refined Oil Pipeline started operations. The 1,150-mile link delivers petroleum products from Urumqi in Xinjiang Province to Lanzhou in Gansu Province. Gradually, this pipeline will connect with other regional spurs to deliver supplies to the eastern coast, as well as accommodate additional oil imports from Kazakhstan. Previously, most oil supplies from Xinjiang were delivered by rail. In addition, the Western Pipeline consists of a crude oil line traversing from Xinjiang to the Lanzhou refinery and which came online in 2007.

In order to push the supply from the Lanzhou refinery to market centers in the east and south, CNPC recently commissioned various oil product pipelines. The company launched the Lanzhou-Chengdu-Chongqing pipeline in 2008 and the 300 thousand bbl/d Lanzhou-Zhengzhou-Changsha pipeline in 2009. The Zhengzhou–Changsha segment is expected to be completed by 2010. PetroChina also has plans to build at least two additional spurs from Zhengzhou, which would help deliver crude oil supplies eastward. One is the Zhengzhou-Jinzhou pipeline, which would deliver oil northeastward to Hubei Province. The other is the Zhengzhou-Changsha link, which would terminate in Hunan Province near the industrial southeast. Parts of these links came online in 2009, and altogether will form the country's largest oil product pipeline network.

International Connections

China inaugurated its first transnational oil pipeline in May 2006 when it began receiving Kazakh

and Russian oil from a pipeline originating in Kazakhstan. The new 200,000 bbl/d pipeline spans 620 miles, connecting Atasu in northern Kazakhstan with Alashankou on the Chinese border in Xinjiang. The pipeline was developed by the Sino-Kazakh Pipeline Company, a joint venture between CNPC and Kazakhstan's KazMunaiGaz (KMG). The pipeline's third leg from Kenkiyak to Atasu and an expansion of the entire pipeline, doubling capacity to 400,000 bbl/d, are to be completed in 2011 by CNPC. Due to financial problems resulting from the recent economic crisis, KMG signed a deal allowing CNPC equity in the upstream oil in return for loans financing several downstream infrastructure projects, including the Kenkiyak to Atasu section. Industry publications suggest that the Atasu to Alashankou line has been running at about 50 percent of capacity, or slightly over 100,000 bbl/d.

Russia's Far East will soon be a source for Chinese crude oil imports. Russian state-owned oil giant Transneft began construction in April 2006 on a pipeline that will span 2,972 miles from the Russian city of Taishet to the Pacific Coast (see Russia Country Analysis Brief). Known as the Eastern Siberia-Pacific Ocean Pipeline (ESPO), the project will be completed in two stages. The first stage of the project includes the construction of a 600,000 bbl/d pipeline from Taishet to Skovorodino. CNPC signed an oil-for-loans agreement with Russian companies Rosneft and Transneft for $25 million and $15 million, respectively, in early 2009 and entails China financing the 43-mile pipeline spur to run from ESPO to the Chinese border in exchange for crude oil deliveries. The first phase of ESPO is expected to deliver 300,000 bbl/d to the Chinese border by the end of 2010. Furthermore, CNPC intends to build a 597-mile pipeline linking the spur with the Daqing oil field in the Northeast.

China has also revived its plans to construct an oil import pipeline from Myanmar through an agreement signed in March 2009. As Myanmar is not a significant oil producer, the pipeline is envisioned as an alternative transport route for crude oil from the Middle East and Africa that would bypass the potential choke point of the Strait of Malacca. The $2.9 billion project includes parallel oil and gas pipelines, and stakeholders are CNPC and Myanmar Oil and Gas Enterprises. The initial capacity is slated for 244,000 bbl/d and ramping up to 400,000 bbl/d.

Refining

China is steadily increasing its oil refining capacity in order to meet the robust demand growth in its coastal provinces. Most industry sources estimate China's installed crude refining capacity as over 9 million bbl/d. China's goal is to augment refining capacity by about 3.3 million bbl/d by 2015 if planned projects come online as scheduled, and China commissioned about 850,000 bbl/d capacity in 2009 according to the International Energy Agency. A recent report by Sinopec stated that the national oil capacity would rise to 10 million bbl/d by 2011 and 15 million bbl/d by 2016. According to the BP Statistical Review of World Energy, refinery utilization in China increased from 67 percent in 1998 to 87 percent in 2009.

Sinopec and CNPC are the two dominant players in China's oil refining sector, accounting for 50 percent and 35 percent of the capacity, respectively. However, CNOOC entered the downstream arena and commissioned the company's first refinery, the 240,000 bbl/d Huizhou plant, in March 2009 in order to process the high-sulfur crudes from its Bohai Bay fields. Sinochem has also proposed a number of new refineries, and national oil companies from Kuwait, Saudi Arabia, Russia, Qatar, and Venezuela have also entered into joint-ventures with Chinese companies to build new refining facilities. The NOCs recently expanded their refining portfolios through commissioning two more refineries in 2010, Sinopec's Tianjin and CNPC's Quinzhou, each carrying capacities of 200,000 bbl/d. By end 2009, Sinopec's total processing capacity reached around 4.2 million bbl/d, up by 12.6 percent over the previous year.

Also, the NDRC plans to eliminate refineries smaller than 20,000 bbl/d that are mostly owned by independent companies in efforts to encourage economies of scale and energy efficiency

measures. In addition, PetroChina (CNPC) is recently branching out to acquire refinery stakes in other countries in efforts to move downstream and secure more global trading and arbitrage opportunities. The company's purchase of Singapore Petroleum Corporation and a portion of Japan's Osaka refinery are cases where PetroChina is looking for a foothold within the region's refining opportunities.

The expansive refining sector has undergone modernization and consolidation in recent years, with dozens of small refineries (teapots), accounting for about 20 percent of total fuel output, shut down and larger refineries expanding and upgrading their existing systems. Domestic price regulations for finished petroleum products have hurt Chinese refiners, particularly smaller ones, in the past few years when oil prices were high because of the large gulf between international oil prices and China's relatively low domestic rates. The new pricing scheme guarantees refiners a 5 percent margin when oil is under $80 per barrel in order to encourage refiners to supply products to the market. This pricing system and the anticipation of continued demand growth is expected to boost refining profits for the major companies.

Planned New Refinery Projects and Upgrades in China

Owner	Location	Capacity	Planned start-date	Notes
Sinopec	Maoming	240,000	2015	Upgrade
	Guangdong / Zhanjiang	300,000	2013	Received environmental approval; developing with Kuwait Petroleum
	Caofeidian	200,000	2015	Awaiting approval
	Shanghai (Caojing)	240,000	2015	Preparing EIS
	Zhenhai/Zhejiang	300,000	2015	Expansion
CNPC/PetroChina	Qinzhou/ Guangxi	200,000 / 200,000	Sept 2010 / TBD	New operation; Expansion - Plan submitted to NDRC to double capacity
	Qinzhou/ Yunnan	200,000	2013	Plans to use oil from Myanmar
	Tianjin	260,000	2015	Feasibility stage; JV with Rosneft
	Guangdong/ Jieyang	400,000	2013	New construction; developed with PDVSA
	Lanzhou	200,000	2015	Expansion
	Henan	200,000	2015+	Feasibility study begun June 2009
	Changzhou	200,000	2015	Feasibility study
	Pengzhou	200,000	2011	Construction
	Ningxia/Yinchuan	100,000	2011	Construction
	Jiangsu/ Taizhou	400,000	2015+	Waiting approval; JV with Qatar and Shell
CNOOC	Huizhou	200,000 / 400,000	2015 / 2020	Expansions
Sinochem	Quanzhou	240,000	2013	Preliminary approval
	Ningbo	240,000	TBD	Pending approval

Sources: Global Insight and FACTS Global Energy

As China diversifies its crude oil import sources and expands oil production domestically, state-owned refiners will have to adjust to the changing crude slate. Traditionally, many of China's refineries were built to handle relatively light and sweet crude oils, such as Daqing and other domestic sources. In recent years, refiners have built or upgraded facilities to support greater Middle Eastern crude oil imports, which tend to be heavy and sour. However, more recently, China's refiners have also had to prepare for high-acid and high-sulfur crude oil streams. Much of the country's planned new oil production in the offshore Bohai Bay is considered high-acid, and China is the largest importer of Sudan's Dar Blend, a high-acid crude. High-acid crude oil tends to be light and sweet, but refiners must install stainless steel metallurgy or utilize other advanced processes to successfully run the crude streams.

Strategic Oil Reserves

China has used stockpiling through its strategic petroleum reserve (SPR) and commercial storage as one strategy in recent years to ensure oil reserves, and this could increase China's need for

imported oil in the future. Also, China's growing demand for crude oil and products in recent years spurs the need for greater storage capacity and inventory build-up. In China's 10th 5-Year Plan (2000-2005), launched in 2001, Chinese officials decided to establish a government-administered strategic oil reserve program to help shield China from potential oil supply disruptions. This system will be built in three stages, and, in 2004, China started construction at four sites that would comprise the first phase of the country's strategic oil reserve program. Phase 1 has a total storage capacity of 103 million barrels at four sites, and was completed in early 2009. Phase 1 storage capacity will amount to approximately 25 days of net oil imports based on 2008 estimates of Chinese oil demand. Phase 1 sites include: Zhenhai in Zhejiang Province (planned capacity 32 million barrels); Aoshan, also in Zhejiang Province (31 million barrels); Huangdao in Shandong Province (20 million barrels); and Dalian in Liaoning Province (19 million barrels). Thereafter, Phase 2, recently under construction for 8 sites, is expected to more than double capacity to almost 270 million barrels by 2012/13. Ultimately, Phase 3 is expected to bring total strategic oil reserve capacity in China to about 500 million barrels by 2016.

The government ceased filling the SPR in 2007 because of mounting crude oil prices, though, between September 2008 and March 2009 when prices descended, the government injected about 60 million bbl (more than 300 thousand bbl/d). The average cost of Phase I SPR storage was $58/bbl. The NDRC plans to strategically purchase oil for the second phase when the prices are reasonably low, so the fill for each addition will likely depend on crude oil prices.

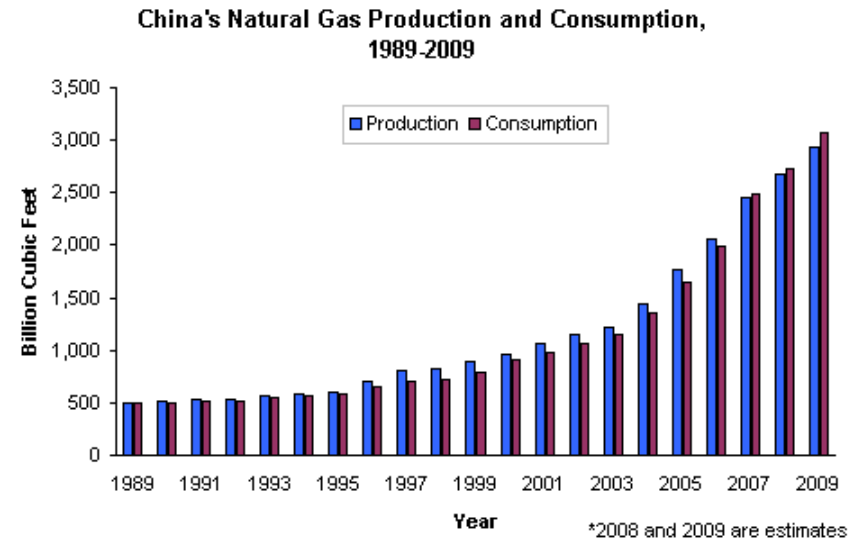
In addition to the SPR, China has approximately 300 million barrels of commercial crude oil storage capacity according to some industry sources, though this number cannot be verified. Also, the government reported that it plans to create a strategic refined oil stockpile to be operated by a subsidiary of NDRC and aims to boost stocks to 80 million barrels by 2011. According to Chinese researchers, oil product storage capacity in China could reach 500 million barrels, over 60 percent of which would be owned by Sinopec and CNPC, by 2015.

Natural Gas

Although natural gas use is increasing in China , it only comprised 4 percent of the country's total energy consumption in 2008.

Natural gas is not a major energy source in China, although its share in the country's consumption mix is increasing. According to *OGJ*, as of January 2010, China had 107 trillion cubic feet (Tcf) of proven natural gas reserves. China's production and demand of natural gas has risen substantially. In 2009, China produced 2,929 billion cubic feet (Bcf) of natural gas, up around 8 percent from 2008, while the country consumed 3,075 Bcf. In 2007, for the first time in almost 2 decades, the country became a net natural gas importer. Consumption for 2009 rose from 2008 levels by over 12 percent, and the country imported over 140 Bcf of liquefied natural gas (LNG) to fill the gap. Although a majority of the gas consumption is dominated by industrial users (45 percent in 2007 according to the National Bureau of Statistics), the recent growth of gas consumption in the past few years stems from the power, utilities, and residential sectors. The Chinese government anticipates boosting the share of natural gas as part of total energy consumption to 10 percent by 2030 to alleviate high pollution from the country's heavy coal use, and IHS indicates that gas demand from power generation could grow from the current 125 Bcf/y to between 530 Bcf and 1,400 Bcf by 2020. EIA projects gas demand to more than triple by 2035, growing about 5 percent per year according to the 2010 *International Energy Outlook*. To meet this anticipated shortfall, China is expected to continue importing natural gas in the future via LNG and is considering a number of potential import pipelines from neighboring countries.

China's potential wealth of unconventional gas resources such as coal bed methane (CBM) and shale gas has spurred the government to seek foreign investors with technical expertise to exploit these reserves. China is estimated to have over 1,000 Tcf of geological CBM reserves, with 350 Tcf recoverable reserves and only 6 Tcf so far of proven reserves by 2010. Although China faces several economic and logistical challenges to producing CBM, the government support and foreign participation is spurring production of this resource. PetroChina plans to invest more than $1.5 billion for CBM projects in the next decade. FACTS Global Energy estimates that total CBM production in 2009 was 696 MMcf/d, and expects production to rise to 2.5 Bcf/d by 2020 and 4.7 Bcf/d by 2030, which could account for up to 18 percent of total domestic gas production in this period. Also, China's first long distance CBM pipeline became operational in late 2009 linking the Qinshui Basin with the West-East pipeline. In early 2010, the Ministry of Land Resources set out its goals regarding shale gas: to discover 35 Tcf of recoverable shale gas reserves, build 500 to 1,000 Bcf/y of production capacity and produce 8 to 12 percent of China's total natural gas from shale gas by 2020. However, FACTS Global Energy estimates more conservative production, below 300 Bcf/y. According to CNPC, current shale gas reserve estimates are about 1,060 Tcf.



Source: EIA International Energy Statistics

Sector Organization

As with oil, the natural gas sector is dominated by the three principal state-owned oil and gas companies: CNPC, Sinopec, and CNOOC. CNPC is the country's largest natural gas company in both the upstream and downstream sectors. CNPC data shows that the company accounts for roughly 80 percent of China's total natural gas output and operates in four major gas producing regions mostly in the resource-rich western China. Sinopec and CNOOC are also playing an increasing role in the natural gas sector. Sinopec operates the Puguang natural gas field in Sichuan Province, one of China's most promising upstream assets. CNOOC led the development of China's first three LNG import terminals at Shenzhen in Guangdong Province, Fujian, and Shanghai and manages much of the country's offshore production.

China's natural gas prices, similar to retail oil prices are regulated based on regional pipeline infrastructure development and the industry customer class and have generally remained well below market rates. China has favored manufacturing and fertilizer gas users by the lower price these sectors pay compared to residential consumers. In order to bolster investment in the growing sector particularly by foreign participants and make domestic gas competitive with other fuels as well as with imported pipeline and liquefied natural gas, the NDRC proposed to indirectly link gas prices to international crude oil prices, effectively raising prices overall in May 2009. Industry analysts claim these price modifications are necessary to further develop the gas market but are likely to be enacted gradually. In mid 2010, the NDRC raised the onshore wellhead prices by 25 percent, and some Chinese cities have raised end-user prices in the industrial and power sectors.

Exploration and Production

China's primary natural gas-producing regions are Sichuan Province in the southwest (Changqing Basin); Shaanganing Province (Ordos Basin); the Xinjiang Uygur Autonomous Region and Qinghai in the northwest (Tarim, Chungeer, and Caidamu Basins) and produce about 65 percent of China's total gas output. Several offshore natural gas fields are located in the Bohai Basin and the Panyu complex in the South China Sea. China's NOCs have also logged several new natural gas finds in the last few years following aggressive E&P work.

The largest recent discoveries are Sinopec's find at the Yuanba and Puguang fields in Sichuan Province. Sinopec started commercial production at Puguang in early 2010 and plans to produce 387 Mmcf/d this year. Exploration at Yuanba has shown proven reserves of 14 Tcf and a potential of 35 Tcf. Sichuan Province also holds the high sulphur content fields at the Chuandongbei basin. Proven gas reserves are 5 Tcf, and production is expected to ramp up to over 420 Bcf/y in 2012. In 2007, CNPC awarded a 30 year production sharing contract (PSC) with Chevron to help develop this technically challenging field and bring production of 560 MMcf online by 2011.

New natural gas fields continue to be developed in the northwestern Tarim and Ordos Basins in Xinjiang. Natural gas output in Xinjiang reached 850 Bcf in 2009 and is currently China's largest gas producing province. In particular, the Tarim Basin holds at least 35.3 Tcf proven natural gas reserves, half of China's total proven reserves, and only 12 percent of the basin has been explored thus far. However, the basin's complex geological features and far distance from China's main consumption centers make development costs relatively higher in the region. PetroChina's cross-country West-East Gas Pipeline, which spans 2,500 miles from the Xinjiang Uygur Autonomous Region to Shanghai, has greatly expanded the upstream potential of the Tarim Basin to supply markets in eastern China. Tarim was the largest gas-producing field in China in 2009,

with 640 Bcf or 22 percent of China's total production and up 25 Bcf from 2008. PetroChina endeavors to increase production at Tarim to over 1 Bcf in 2015 and 1.8 Bcf in 2020 in order to feed the West-East pipeline and planned additions. The NOC is currently developing the recently discovered Tazhong 1, Dina-2, and Kela-2 gas fields. The Kela-2 field is slated to feed gas to the West to East Pipeline as its production ramps up to 700 Bcf/y in 2010. Other new discoveries in the northwest that have high potential of gas supply are the Junggar Basin in Xinjiang Province and the Qaidam Basin in Qinghai Province. The Junggar Basin, another basin with significant potential in the Northwest region, has 74 Tcf of gas reserves, with less than 4 percent proven gas; however, PetroChina is discovering more gas fields in the basin each year. Production in Junggar was 3.6 Tcf as of 2009.

Offshore

Offshore zones have also received increasing attention for upstream natural gas developments in China, particularly in the South China Sea. The South China Sea is home to the Yacheng 13-1 field, China's largest offshore natural gas field and a primary source of energy for Hong Kong's power stations. The Yacheng 13-1 field is operated by BP (34 percent), with CNOOC (51 percent) and Kuwait Foreign Petroleum Exploration Company (15 percent), and produces about 124 Bcf/y of natural gas. According to IHS, gas reserves in China's offshore continental shelf are estimated at 10.6 Tcf of in-place gas to date.

CNOOC stated in 2008 that its long-term development plan is to spend about $29 billion between 2009 and 2020 launching projects in the South China Sea. The NOC also announced that it intends to produce 50 million tons of oil-equivalent of crude oil and natural gas in 2010 from both offshore areas. This target is roughly 26 percent higher than production in 2009. The Panyu 30-1 field was brought on in 2009 and is expected to peak at 160 MMcf/d. In June 2006, CNOOC and Husky Energy announced the country's first deepwater natural gas discovery at the Liwan 3-1 field near the Spratley Islands in the South China Sea. Since then, Husky Energy discovered two more fields Liuhua 34-2 and Liuhua 29-1 near Liwan. The NOC estimates 4 to 6 Tcf in reserves for the block and anticipates peak production of 150 MMcf/d with a target commercial date of 2013. CNOOC typically uses PSC agreements with foreign companies wanting to co-develop projects and has the right to acquire up to a 51 percent working interest in all offshore discoveries once the IOC recovers its development costs.

Sinopec began exploring deepwater wells in the Qiongdongnan Basin in 2009 with Statoil. This basin has proven and probably gas reserve potential of 3,068 Bcf.

Pipelines

China has a fragmented natural gas pipeline network though the government is investing in integrating local gas distribution networks and plans to construct 14,400 miles of new pipelines between 2009 and 2015. Industry sources estimate that China had nearly 21,000 miles of natural gas pipelines at the end of 2009 and is increasing pipeline coverage by 6 percent per year. While the major NOCs operate the trunk pipelines, local transmission networks are operated by various local distribution companies throughout China, which often act as effective regional monopolies. This has so far prevented the emergence of a national gas transmission grid. CNPC moved into the downstream gas sector recently through aggressive investments totaling $108 million in gas retail projects in 14 provinces. Also, CNPC is investing in several pipeline projects in order to facilitate domestic gas transportation as well as increase gas imports for a growing market.

Sinopec is also a major player in the downstream transmission sector, operating many pipelines in the Sichuan province. Recently, the NOC commissioned the 1,000 mile, 425 Bcf/y pipeline running across 8 provinces from its recently operating Puguang field to Shanghai. Companies are also looking to move gas onshore through extensive pipelines as well.

West-East Gas Pipeline

PetroChina's West-East Gas Pipeline, which was commissioned in 2004, is China's single-largest natural gas pipeline at 2,500 miles in length. The pipeline links major natural gas supply bases in western China (Tarim, Qaidam, and Ordos Basins) with markets in the eastern part of the country. The Chinese government promoted the construction of the West-East Gas Pipeline to supply natural gas consumption to the eastern and southern regions of the country. The West-East pipeline has an annual capacity of 424 Bcf/y and contains numerous regional spurs along the main route, which has improved the interconnectivity of China's natural gas transport network. PetroChina has plans to increase the pipeline's capacity to 600 Bcf/y in the future.

Using economic stimulus funds, CNPC is building a 1.1 Tcf/y second west-to-east trunk pipeline to accommodate additional production in the Tarim Basin and natural gas imports from Central Asia. The eastern section of the line would run from the Sino-Kazakh border to Guangzhou in Guangdong Province, spanning more than 4,000 miles at a cost of $10.3 billion and is due to be online by 2012. The western section of the line became operational at the end of 2009 and will serve the markets of Shanghai once the eastern section is complete.

In order to accommodate greater gas flows from Central Asia, CNPC released plans to construct the third West-East Pipeline to partially run parallel to the second West-East line and end in the southern province of Guizhou. CNPC estimates that it will invest approximately $14.6 billion in the

project. Analysts anticipate that the 0.7 to 1 Tcf/y pipeline will offtake gas from Turkmenistan's production and domestic output from the Junggar fields, though supply arrangements are still undefined. There have been proposals for a fourth and fifth West-East pipelines which are in pre-feasibility stages. The Tarim Basin is reportedly slated to feed gas to the fourth line.

International Pipelines

China's first import natural gas pipeline is the Central Asian Gas Pipeline (CAGP), which spans 1,130 miles and bring natural gas imports to China from Turkmenistan, Uzbekistan, and Kazakhstan. In December 2009, CNPC was awarded a PSC to develop natural gas resources at Turkmenistan's large South Yolotan gas fields, and signed a deal with Turkmengaz, the state-owned gas company, to import natural gas supplies. The pipeline began operations in December 2009 with 200 Bcf/y and links to the second West-East pipeline in China. Turkmenistan announced that it intends to raise the gas supply ultimately to 1.4 Tcf/y once the South Yolotan field development is complete in 2012 in order to diversify its customer base, though Turkmen's gas reserves have not been verified. A field audit performed by Gaffney, Cline and Associates in 2008 estimated between 140 to 500 Tcf of reserves. The line traverses Kazakhstan and Uzbekistan, who will likely contribute some of the natural gas exports to the pipeline. In June 2010, CNPC signed an MOU with Uzbekistan to deliver over 350 Bcf/y through a transmission line that would connect with the CAGP. Kazakhstan and China also signed an joint venture agreement in June 2010 to jointly construct the second phase of the Kazakh-China gas pipeline, essentially starting in western Kazakhstan and linking to the CAGP. Pipeline commissioning could begin in 2012.

There are several proposed pipelines that could contribute to Chinese natural gas imports in the future.

- In March 2006, CNPC officials signed a Memorandum of Understanding (MOU) with Russia's Gazprom for two pipeline proposals that could send natural gas supplies from Russia's Far East in the next decade. The Western route, known as the Altai Project would connect Russia's Kovykta gas field to the Xinjiang region in northwest China. The proposed pipeline has a capacity between 1 and 1.4 Tcf/y that is slated to be operational by 2015, though price negotiations are ongoing until 2011.
- A second proposed route, called the Eastern pipeline, would connect Russia's Far East and Sakhalin Island to northeastern China, most likely terminating near Beijing. Plans for the Eastern route also call for a pipeline with 1,060 – 1,410 Bcf/y capacity (see the Russia Country Analysis Brief for more information). Russia and China continue to have ongoing negotiations on price and pipeline financing measures.
- CNPC signed a deal with Myanmar in March 2009 to finance the construction of a 1,123-mile, 420 Bcf/y pipeline from two of Myanmar's offshore blocks to Kunming, China. Construction began on the project, due to commence in 2013. The gas pipeline consortium consists of Daewoo, CNPC, and ONGC of India.

Liquefied Natural Gas

As its natural gas demand is burgeoning and creating a domestic supply shortage, China is in the process of building regasification capacity as an additional source of imported volumes and looking to compete in the Asian LNG arena. However, the higher international LNG prices versus lower prices from domestic gas and gas from the West-East pipeline could cause more competition for this gas source in the future.

China imported its first shipment of LNG in the summer 2006, and the country has quickly ramped up imports since then, importing about 730 MMcf/d in 2009 and 1,120 MMcf/d in the first half of 2010. LNG now enters the country through 3 terminals with another 4 under construction and more receiving government approvals. CNOOC is the key LNG player in China and operates all three existing plants. Dapeng LNG and Fujian LNG, joint ventures between CNOOC and BP, currently have capacities of 860 MMcf/d and 335 MMcf/d, respectively, and are serving several new gas-fired power plants and local distribution companies. Shanghai LNG just became operational in late 2009, is a joint venture between CNOOC and Shenergy Group, and is supplied by a long term deal with Petronas' Tiga liquefaction terminal in Malaysia. CNOOC imports LNG for Dapeng from a 425 MMcf/d, 25-year contract with Australia's North West Shelf liquefaction terminal. About 65 percent of this LNG supplies six power plants with the remaining used in town gas. Following price renegotiations between the Chinese and the Indonesian governments, Fujian LNG has been receiving spot cargoes and first deliveries from the 25-year contract with BP's Tangguh project in Indonesia.

Chinese NOCs must secure supply prior to gaining government approval to build a regasification terminal, and Chinese firms are faced with competition from other regional buyers mainly in Korea and Japan. Therefore, CNOOC and PetroChina have signed several long terms supply contracts for about 3 Bcf/d. These contracts are primarily with Asian firms sourcing LNG from Indonesia, Malaysia, and Australia; however Chinese NOCs have signed long-term contracts with other sources such as QatarGas and global upstream developers that can supply LNG from various international liquefaction assets. The average LNG import price for China was $7.05/MMbtu by the first quarter of 2010, almost double that of the average 2009 price as companies face more

competitive market prices within Asia and newer long-term contracts become more expensive. CNPC recently signed agreements with various LNG global players such as Total, Shell, and ExxonMobil. In March 2010, CNOOC signed a sales and purchase agreement with BG Group for 474 MMcf/d of LNG supply over 20 years and a 5 percent equity stake at Australia's Queensland Curtis LNG terminal. In October 2010, the Chinese firm signed an LNG supply deal with GDF Suez for 335 MMcf/d.

Several regasification terminals are under construction, while Chinese NOCs and joint ventures are planning or have proposed multiple facilities. CNOOC is keenly interested in growing its LNG market as it has a competitive advantage thus far in the sector compared to the other NOCs. In addition, CNOOC received approval to build its planned Zhejiang plant from the NDRC and intends to expand the company's three existing terminals. PetroChina entered the LNG market and is currently building the Dalian and Jiangsu regasification terminals with several more proposed projects.

Key LNG Terminals – Current and Proposed

Terminal Name	Status/Online Date	Developer	Initial / Expansion Capacity (MMcf/d)	Possible Supplier
Dapeng/ Guangdong	Operational; Expansion / 2011	CNOOC; BP	880 / 300	Australia NWS
Fujian	Operational; Expansion / 2012	CNOOC	335 / 335	Indonesia - Tangguh
Shanghai	Operational; Expansion / 2012	CNOOC; Shenergy	390 / 390	Malaysia - Petronas
Dalian	Construction / 2011; Expansion / TBD	PetroChina	390 / 390	QatarGas II; Australia
Rudong/Jiangsu	Construction /July 2011; Expansion / TBD	CNPC; RGM Int'l; CITIC	450 / 390	QatarGas IV
Shenzhen	Permit from NDRC; Awaiting siting permits	CNPC; CLP	260	Australia's Gorgon LNG (ExxonMobil)
Zhejiang/Ningbo	Construction / 2012; Expansion / TBD	CNOOC	390 / 390	TBD
Zhuhai	Construction / 2013	CNOOC;Yudian Group	395	TBD
Qingdao/ Shandong	Approved for construction / 2013; Expansion / TBD	Sinopec; Huaneng Group	390 / 390	PNG LNG (ExxonMobil)
Hainan	Passed EIS / 2014; Expansion / 2017	CNOOC;Hainan Development	260 / 130	TBD
Tangshan	Preliminary phase	PetroChina	450 / 390	TBD
Beihai	Preliminary approval	Sinopec	390	TBD
JiangsuYancheng	Preliminary phase	CNOOC;YanchengMunicipal	390	TBD

Sources: Global Insight, FACTS Global Energy, and Reuters

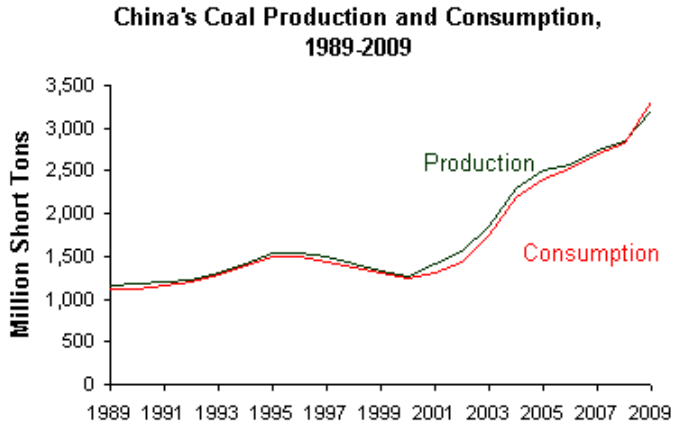
Coal

China is the largest producer and consumer of coal in the world, and many of China 's large coal reserves have yet to be developed.

Coal makes up 74 percent of China's total primary energy consumption, and China is both the largest consumer and producer of coal in the world. According to the World Energy Council, as of 2009, China held an estimated 114.5 billion short tons of recoverable coal reserves, the third-largest in the world behind the United States and Russia and about 14 percent of the world's total reserves. There are 27 provinces in China that produce coal. Northern China, especially the Shanxi and Inner Mongolia Provinces, contains most of China's easily accessible coal and virtually all of the large state-owned mines. Coal from southern mines tends to be higher in sulfur and ash, and therefore unsuitable for many applications. In 2009, China consumed an estimated 3.3 billion short tons of coal, representing over 40 percent of the world total and a 167 percent increase

since 2000. Coal consumption has been on the rise in China over the last nine years, reversing the decline seen from 1996 to 2000. Coal production is also rising was an estimated 3.2 billion short tons in 2009.

China's coal imports started growing after 2002 because imported coal prices including transportation became competitive with domestic production prices, and the coal industry began suffering from frequent bottlenecks in transmission to consumer markets. In 2009, China, typically a net coal exporter, became a net coal importer from countries such as Indonesia, Australia, Vietnam, and Russia. In September 2009, the China Coal Transportation and Distribution Association stated that signed a $6 billion loan for coal agreement with Russia for 15 to 20 million tons of coal for 25 years.



Source: EIA International Energy Statistics 2009 estimated

China's coal industry has traditionally been fragmented among large state-owned coal mines, local state-owned coal mines, and thousands of town and village coal mines. The top three state-owned coal companies produce less than 15 percent of the domestic coal. Shenhua Coal, the world's largest coal company, holds 9 percent of the domestic market in China.

Though the smaller coal mines currently hold a sizeable portion of the market, they are inefficient and are challenged to respond to market demand. China has tens of thousands of small local coal mines where insufficient investment, outdated equipment, and poor safety records prevent the full utilization of coal resources. The goal of consolidating the industry is to raise total coal output, attract greater investment and new coal technologies, and improve the safety and environmental record of coal mines. Also, as part of China's 12th Five-Year Plan, the government intends to consolidate the sector more and have large mines with over 50 million tons of capacity account for more than 65 percent of the total capacity by 2015. Industry analysts estimate fewer than 10,000 small mines will remain by the end of 2010. Also, the State Council began promoting cross-business ventures and participation between power, industrial and coal companies in order to facilitate the coal sector consolidation process in 2009.

In contrast to the past, China is becoming increasingly open to foreign investment in the coal sector, particularly in an effort to modernize existing large-scale mines and introduce new technologies into China's coal industry. The China National Coal Import and Export Corporation is the primary Chinese partner for foreign investors in the coal sector. Areas of interest in foreign investment concentrate on new technologies with efficiency and environmental benefits, including coal liquefaction, CBM production, coal-to-gas and slurry pipeline transportation projects. The Chinese government is actively promoting the development of a large coal-to-liquids industry. A Shenhua Group subsidiary commissioned the country's first coal-to-liquids plant in 2009. The facility is located in the Inner Mongolia Autonomous Region and has an initial capacity of approximately 24,000 bbl/d of diesel, ramping up to 240,000 bbl/d by 2015. Shenhua Group and Sasol Limited began construction on a second CTL project, Ningxia CTL, in 2010 and expect to commission 80,000 bbl/d by 2017. CNPC signed an agreement with Shanxi Energy Industries Group to develop CBM resources in the Qinshui Basin in 2007, and the NOC has been performing technological research on CBM plays in northern China for over a decade and accounts for 45 percent of this industry in China. Also, in another attempt to move into downstream markets and garner technological experience, CNOOC is investing in coal-to-gas projects in Inner Mongolia and Shanxi provinces.

Electricity

China's electricity generation continues to be dominated by

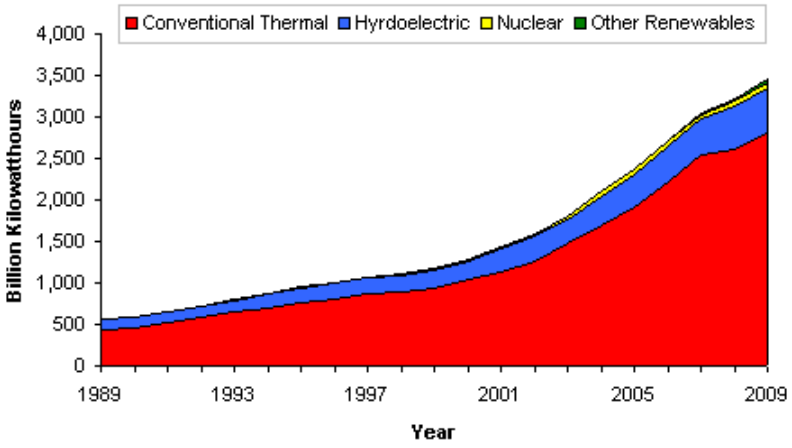
In 2008, China had an estimated total installed electricity generating capacity of 797 gigawatts (GW) and in 2009, net generation was 3,446 billion kilowatt-hours (Bkwh), 82 percent of which came from conventional thermal sources. Installed capacity increased over 10 percent between

fossil fuel sources, particularly coal. The Chinese government has made the expansion of natural gas-fired and renewable power plants as well as electricity transmission a priority.

2007 and 2008 and is expected to grow in the next decade to meet rising demand particularly from demand centers in the East and South of the country. FACTS Global Energy expects installed capacity will be 950 GW by the end of 2010, and some Chinese government officials forecast capacity may be 1,500 GW by 2020. Both electricity generation and consumption have increased by over 110 percent since 2000, and trade press reported that generation was up 20 percent in the first half of 2010 compared to a year earlier. EIA predicts total net generation to increase to 10,555 Bkwh by 2035, over 3 times the amount in 2009.

Rapid growth in electricity demand this previous decade has spurred significant amounts of investment in new power stations. Although much of the new investment was earmarked to alleviate electricity supply shortages, the economic crisis of late 2008 resulted in a lower power sales growth mainly during the first half of 2009. Some industry analysts forecast the possibility of oversupply as an assortment of new projects are scheduled to come online in the next few years, though power demand is already rebounding as the Chinese economy recovers. The government is focused on using some of the stimulus package funds to invest in further development of the transmission network, integration of regional networks, and bringing on planned new generating capacity. For the first time in 2008, the investment in the transmission grid was greater than that in the generation sector. The State Grid Company spent $44 billion in 2009 and plans to spend $33.3 billion in 2010 on grid investment, using some stimulus funds.

China's Electricity Generation by Type, 1989-2009



Source: EIA International Energy Statistics

Sector Organization

In 2002, the Chinese government dismantled the monopoly State Power Corporation (SPC) into separate generation, transmission, and services units. Since the reform, China's electricity generation sector is dominated by five state-owned holding companies, namely China Huaneng Group, China Datang Group, China Huandian, Guodian Power, and China Power Investment. These five holding companies generate about half of China's electricity. Much of the remainder is generated by independent power producers (IPPs), often in partnership with the privately-listed arms of the state-owned companies. Deregulation and other reforms have opened the electricity sector to foreign investment, although this has so far been limited.

While the generation sector has some market competition, the transmission and distribution sectors are heavily state-controlled. During the 2002 reforms, SPC divested all of its electricity transmission and distribution assets into two new companies, the Southern Power Company and the State Power Grid Company. The government aims to merge SPC's 12 regional grids into three large power grid networks, namely a northern and northwestern grid operated by State Power Grid Company and a southern grid operated by the Southern Power Company by 2020. Also in 2002, the State Electricity Regulatory Commission (SERC) was established, which is responsible for the overall regulation of the electricity sector and improving investment and competition in order to alleviate power shortages.

Wholesale and retail electricity prices are determined and capped by the NDRC which can limit the profit margin of generators. Also, the NDRC determines a plan price that coal companies should sell to power producers for a certain level of supplies. Typically, generators negotiate directly with coal companies for long-term contracts, though in the past few years, rising power demand and higher coal costs led to some power shortages and higher costs for generators. Coal prices then collapsed in 2009. The NDRC made small changes to its pricing system, and in 2009, the agency allowed electricity producers and wholesale end-users such as industrial consumers to negotiate with each other directly. Also, China raised end-user prices for all sectors except the

residential sector by $0.04/kwh in late 2009. The latest power tariff changes were from June 2010 when the government raised rates for energy intensive industries by 50 to 100 percent in order to achieve energy efficiency goals for the year.

Conventional Thermal

Conventional thermal sources currently make up about 81 percent of power generation and over 77 percent of installed capacity and are expected to remain the dominant fuel in the power sector in the coming years, with many projects that will use coal or natural gas. In 2009, China generated about 2,803 Bkwh from fossil fuel sources. The Chinese government envisages thermal installed capacity will reach 1,000 GW by 2020 up from 652 GW in 2009 and will represent about two-thirds of the total capacity. EIA predicts a more conservative growth for capacity, reaching 812 GW by 2020 and 1,300 GW by 2035.

Because of the large amount of reserves, coal will continue to dominate the fuel feedstock for the power capacity and generation even as other cleaner fuels increase market share. Coal consists of roughly 80 percent of the power generation feedstock, and the EIA forecasts the fuel will decline to 74 percent in market share by 2035. As with coal mining, the Chinese government is looking to shut down or modernize many small and inefficient power plants in favor of medium-sized (300 to 600 MW) and large (1000 MW and up) units. In its upcoming twelfth five-year plan, covering the period 2011-2015, China anticipates the country increasing the share of natural gas and other cleaner technologies in the country's energy mix and close several smaller coal-fired plants that were less efficient and heavy polluters. The NEA announced that the government had met its annual target to remove 10 GW of coal-fired generation from small capacity generators in 2010 and that over 70 GW had been retired overall from 2006 to 2010. In following this trend, the NEA forecasts another 8 GW of coal generation will be removed in 2011.

Natural gas currently plays a small role in the power generation mix (currently 5 percent of installed capacity and 2 percent in net generation); however, the government plans to invest in more gas-fired power plants as a growing marginal fuel source. Gas prices declined in 2010, and China is able to source the fuel from growing domestic sources as well as growing import alternatives, though coal still remains the less expensive feedstock. There are several examples of China's effort to bring new combined cycle units online, some in conjunction with new LNG terminals such as those in the Guangdong and Shanghai. Also, there are several coal-fired and oil-fired power plants that are being converted to run on natural gas in Guangdong. In May 2010, Huaneng Power International, China's largest listed electricity generation company, signed strategic agreements with CNOOC to explore opportunities for gas-to-power projects in the coastal areas near regasification terminals, and the company announced plans to spend over $14 billion on coal, gas, and power generation development in the western Xinjiang region.

Hydroelectric and Renewables

China commissioned the Three Gorges Dam hydroelectric facility, the largest hydroelectric project in the world, in 2009.

China has a goal to generate at least 15 percent of total energy output by 2020 using renewable energy sources as the government aims to shift to a less-resource intense economy. According to the consultancy EC Harris, in 2010, China is the world's top investor in renewable energy projects, having invested around $120 billion to $160 billion between 2007 and 2010.

In 2009, China was the world's largest producer of hydroelectric power. In the same year, China generated 549 Bkwh of electricity from hydroelectric sources, representing 16 percent of its total generation. Also, according to FACTS Global Energy, installed generating capacity was around 197 GW in 2009, accounting for over a fifth of total installed capacity. These figures are likely to increase given the number of large-scale hydroelectric projects planned or under construction in China, and the government's State Energy Bureau announced plans to increase hydro capacity to 380 GW by 2020. The largest power project under construction is the Three Gorges Dam along the Yangtze River, which will include 32 separate 700-MW generators, for a total of 22.5 GW. When fully completed, it will be the largest hydroelectric dam in the world. The Three Gorges project already has several units in operation as of 2009, but the project is not expected to be fully completed until 2011.

Wind is the second leading renewable source for power generation, and China is the world's fifth largest wind producer, generating 25 Bkwh in 2009, growing 100 percent from 2008. China's installed capacity by 2010 was 16 GW according to FACTS Global Energy, and has roughly doubled capacity each year since 2005. However, the lack of transmission infrastructure in this sector has left a significant amount of capacity inoperable. The NDRC aims to increase wind capacity to 100 GW by 2020.

Nuclear

China is also actively promoting nuclear power as a clean and efficient source of electricity generation. Although nuclear capacity (around 9 GW) makes up only a small fraction of China's installed generating capacity, many of the major developments taking place in the Chinese electricity sector recently involve nuclear power. China's government forecasts that over 70 GW will be added by 2020. EIA forecasts that China will increase its nuclear generation to about 598 Bkwh by 2035, growing at an annual rate of 8.4 percent and increasing its share of total power generation from 2 percent in 2009 to 6 percent in 2035.

As of mid-2010, China has 11 operating reactors, 8 new nuclear power plants under construction and another 8 in the planning stage, the biggest of which is a 4.4-GW nuclear complex at Haiyang in Shandong province, set to begin commercial operation in 2014.

China also intends to build strategic and commercial uranium stockpiles through overseas purchases as well as further developing domestic production in Inner Mongolia and Xinjiang.

Profile

Energy Overview

Proven Oil Reserves (January 1, 2010E)	20 billion barrels
Oil Production (2009)	3,991 thousand barrels per day
Oil Consumption (2009)	8,200 thousand barrels per day
Crude Oil Distillation Capacity (2009)	6,400 thousand barrels per day
Proven Natural Gas Reserves (January 1, 2010E)	107 trillion cubic feet
Natural Gas Production (2009)	2,929 billion cubic feet
Natural Gas Consumption (2009)	3,075 billion cubic feet
Recoverable Coal Reserves (2005)	126.2 billion short tons
Coal Production (2009E)	3,210 million short tons
Coal Consumption (2009E)	3,309 million short tons
Electricity Installed Capacity (2008)	797 gigawatts
Electricity Production (2009E)	3,446 billion kilowatt hours
Electricity Consumption (2008)	3,017 billion kilowatt hours
Total Energy Consumption (2008)	77.3 quadrillion Btus*, of which Coal (74%), Oil (15%), Hydroelectricity (7%), Natural Gas (4%), Nuclear (1%), Other Renewables (0.2%)
Total Per Capita Energy Consumption (2007)	58.9 million Btus
Energy Intensity (2007)	11,412 Btu per $2005-PPP**

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2008)	6,534 million metric tons
Per-Capita, Energy-Related Carbon Dioxide Emissions (2008)	4.9 metric tons
Carbon Dioxide Intensity (2008)	0.9 Metric tons per thousand $2005-PPP**

Oil and Gas Industry

Organization	China's oil and gas industry is dominated by three state-owned holding companies: the China National Petroleum Corporation (CNPC); the China Petroleum and Chemical Corporation (Sinopec); and the China National Offshore Oil Corporation (CNOOC).
Major Oil/Gas Ports	Shanghai, Zhanjiang, Zhuhai, Guangzhou, Xiamen (Amoy), Hangzhou, Qingdao, Dalian, Tianjin
Major Refineries (capacity, bbl/d)	Zhenhai (403,000), Ningbo (320,000), Nanjing (270,000 and 160,000), Maoming (270,000), Lazhou (250,000)

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power.
**GDP figures from Global Insight estimates based on purchasing power parity (PPP) exchange rates.

Links

EIA Links
EIA – China Country Energy Profiles

U.S. Government
CIA World Factbook - China
Lawrence Berkeley National Laboratory (LBNL) - China Energy Group
National Renewable Energy Laboratory (NREL)
U.S. State Department Consular Information Sheet - China Programs
U.S. State Department Background Notes on China
U.S. Embassy, Beijing
U.S. Census Bureau – U.S. Trade Balance
U.S. Trade Representative (USTR) – China Affairs

Associations and Institutions
Asian Development Bank (ADB) – China page
The World Bank
The International Monetary Fund – China page
The United Nations (UN) in China
The World Trade Organization (WTO) – China page
The World Health Organization (WHO) – China page
Association of Southeast Asian Nations (ASEAN)
Asia-Pacific Economic Forum (APEC)

Foreign Government Agencies
National Bureau of Statistics of China
National Development and Reform Commission (NDRC)
China's Ministry of Commerce
China's Ministry of Foreign Affairs
China's Ministry of Land and Resources

Non-Governmental Organizations
The China Sustainable Energy Program (CSEP)
Peterson Institute for International Economics (IIE)
National Bureau of Asian Research (NBR) – Asian Energy Security Program

Oil and Natural Gas
China National Petroleum Corporation (CNPC)
China Petrochemical Corporation (Sinopec)
China National Offshore Oil Corporation (CNOOC)
ExxonMobil
Shell
BP
ConocoPhillips

Sources

Asia Pulse
BBC
Business Week
China Daily
China Oil and Gas Monthly
Coal Week International
Congressional Research Service
Dow Jones Newswire
Economist
Economist Intelligence Unit
FACTS Global Energy
Financial Times
Foreign Affairs
Global Insight
International Gas Report
National Bureau of Statistics of China
Oil and Gas Journal
Petroleum Economist
Petroleum Argus Weekly
Petroleum Intelligence Weekly
Petroleum Review
PFC Energy
Platts Commodity News
Reuters
Rigzone
U.S. Commerce Department

U.S. En ergy Information Administration
Wall Street Journal
World Gas Intelligence
Xinhua News Agency

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